PATENT
Docket No. 57160US002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Darren T. CASTRO et al.	Group Art Unit:	1775
Serial No.:	10/034,642	Examiner:	Gwendolyn Blackwell Rudasill
Confirmation No.:	9543		
Filed:	December 28, 2001		
For:	POLYCRYSTALLINE TRANSLUCENT ALUMINA-BASED CERAMIC MATERIAL, USES AND METHODS		

Declaration under 37 C.F.R. §1.131

Assistant Commissioner for Patents
Mail Stop AF
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

We, Darren T. Castro and Richard P. Rusin, declare and say as follows:

1. We are the inventors of the subject matter of the claims presently pending in the above-identified U.S. Patent Application Serial No. 10/034,642, filed December 28, 2001.

2. I, Darren T. Castro, am a Technical Manager at 3M, St. Paul, Minnesota.

3. I, Richard P. Rusin, am a Product Development Specialist at 3M, St. Paul, Minnesota.

4. We have reviewed the above-entitled U.S. Patent Application.

5. Prior to May 19, 2000, one of us, Darren T. Castro, reduced to practice a polycrystalline translucent aluminum oxide ceramic material having an average grain size of no greater than 1.0 micron, and a method of making the same. This invention is evidenced, for example, by the redacted notebook pages marked Exhibits A-C.

6. Specifically, Exhibit A describes a method for preparing a sample of polycrystalline aluminum oxide ceramic material (TM-DAR 1250) with low grain growth ("g g") by hot isostatic pressing ("HIPing") a sintered article at 1250°C. Exhibit B describes the sample as "translucent / clear." The scanning electron micrograph of sample TM-DAR 1250 illustrated in Exhibit C shows an average grain size of no greater than 1.0 micron.

6. We hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the likes so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

20 Sep 04
Date

Darren T. Castro
Darren T. Castro

9/20/04
Date

Richard P. Rusin
Richard P. Rusin

DO NOT REPRODUCE

NOTEBOOK NO. -Redacted-

PROJECT NO. -Redacted- SUBJECT: -Redacted- DATE: -Redacted-

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Want to prepare a batch of cast TM-DAR to try HIPing at 1250 C or lower to push to full density with less E.G. than got at 1300 C for 2 hrs. In looking at the last 2 batches of transvaped TM-DAR, first batch ground 137% (1861 g total out vs 1363 g for C321) of C321 while 2nd did only 126% (1673 g total out vs 1322 g for C321). Differences in prep were use of foamkill in first batch, higher burnout T (690 C in 1st vs. 630 C in 2nd), and the amount of water used. Follow first batch procedures directly as shown below:

Bottle weighs 101.03 g. Added 170.62 g of TM-DAR, 0.24 g of NHC, 63.74 g of water, and 1 drop of foamkill. Was very agglomerated/pasty. Added another 73.44 g of water without any beneficial effect. Added another 0.29 g of NHC. Dispersed it all very nicely. Sonicated for 2 hrs and then poured out into pan. Did transvap. Again this appeared to be too much water and not quite enough powder. Produced 169 g of flakes. Burn out in Lindberg in air at 690 C overnight.

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AUTHOR'S FULL NAME or INITIALS -Redacted- DATE: -Redacted-

WITNESS'S FULL NAME or INITIALS -Redacted- DATE: -Redacted-

(READ AND UNDERSTOOD)

Exhibit B

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WHILE IN THIS MARGIN

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-Redacted- TM-DAR tilt stone 2 hrs, transvap # 3, 1230 C, 1.5 hrs 20 C/min r and c in air, HIP at 1250 C for 30 min at 30 ksi

Deg C=		H2O Dens
72	22.222222	0.9977

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WD	WSS	WS	p	% p
0.3155	0.2356	0.3155	3.9396039	99.48%
0.253	0.1885	0.253	3.9134589	98.82%
0.1681	0.1258	0.1684	3.9369336	99.42%
			3.9299988	99.24%

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No real difference in pre and post HIP density, but these flakes are translucent / clear.

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TMDAR HIP 1250 C – very nice densification. Smallest grains seen yet with powder Al2O3 materials!

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